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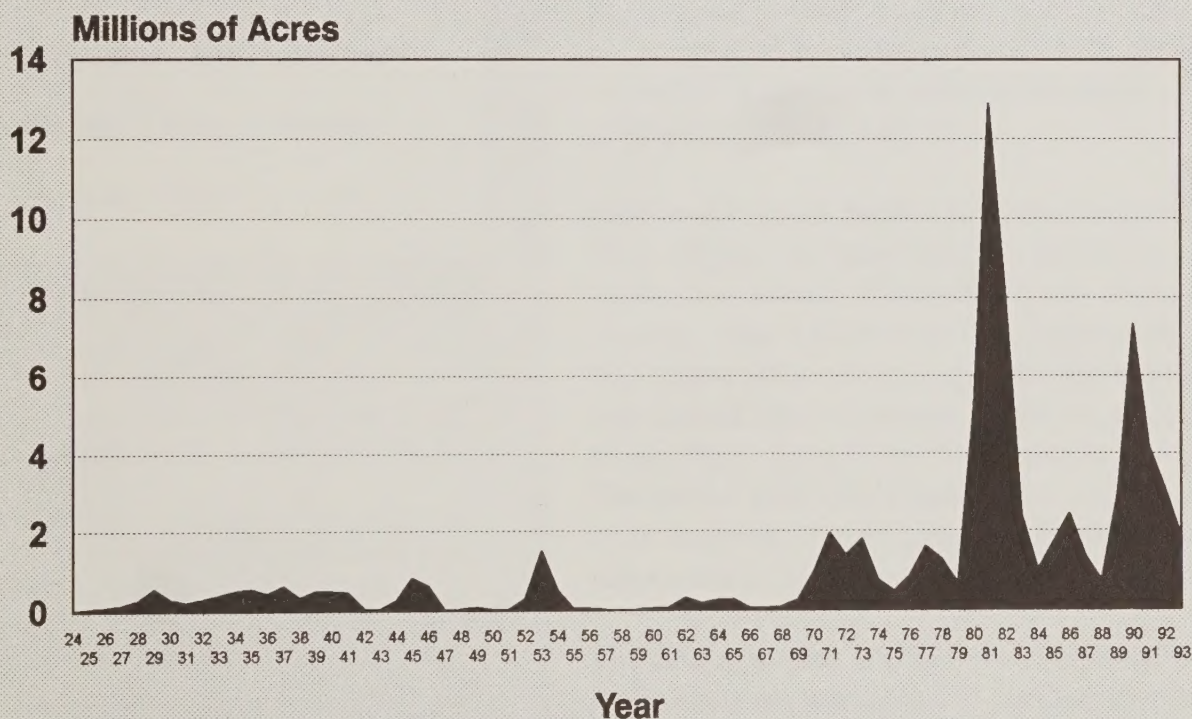


Gypsy Moth News

Issue No. 35

June 1994

Gypsy moth defoliation in the USA, 1924-1993



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- Defoliation history
- Spray history and insecticide use
- Cost of spraying

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From the Editor

The USDA Forest Service, has over the years, amassed information about gypsy moth outbreaks and efforts to control them. This information comes from State and Federal agencies participating in what is known as Cooperative Suppression Projects. Suppression is an attempt to minimize forest damage caused by the gypsy moth. Gypsy moth suppression projects are currently underway throughout the mid-Atlantic States, Virginia, Michigan, and Ohio. In areas where the moth is not yet firmly established, an attempt is made first to eradicate the moth. This has been done rather successfully in Oregon and Washington in recent years. If eradication fails or the insect spreads, suppression projects are initiated to focus treatment on high-value areas or areas where landowners do not want to risk tree mortality. Suppression versus eradication. They are different strategies. Got it?

Here at the Forest Service office in Morgantown, West Virginia, we keep tabs on suppression and eradication efforts. We do this in two computerized systems. One is a National Pest Suppression Tracking System where daily spray activities are reported and entered into a database, tabulated, and provided to our Washington Office for monitoring purposes. The second is the GMDigest where records of gypsy moth spraying, cost of spraying, and defoliation are maintained in a database that spans over 50 years.

The charts, graphs, and tables of information found in this issue are summaries of GMDigest suppression, defoliation, and cost data. During the next several months, we plan to add eradication data and make the Digest a complete package of information. Data from the Digest is available in a variety of formats. If you would like to know more, contact the *News* by writing to the address found in this issue, or call Helen Machesky at 304-285-1548.

I hope you find the information in this issue to be useful.

-DBT

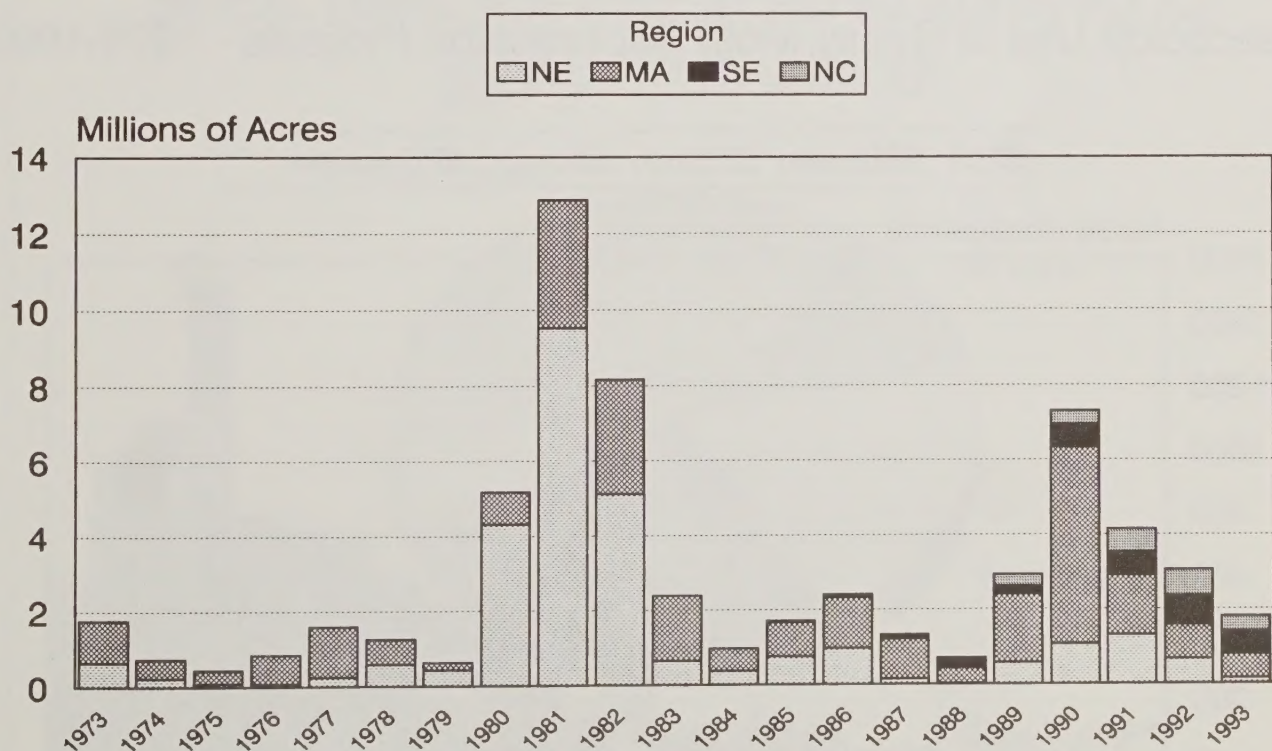
Gypsy moth: the defoliator

So how is the gypsy moth doing this year? To answer that question, we frequently refer to a statistic known as acres of defoliation. Acres of defoliation are obtained by State and Federal pest specialists during annual aerial surveys over infested areas. It is nothing more than a gross estimate of how many acres of forest land have been defoliated in a given year over large areas. It doesn't tell us about the severity of the defoliation, nor the vitality of the gypsy moth population itself. It does, however, provide a relatively

inexpensive measure of gypsy moth activity and where that activity is taking place.

The graph on the cover illustrates defoliation history since 1924. During the years 1924 to 1970, gypsy moth defoliation was pretty much restricted to New England and New York. After 1970, defoliation began occurring in the mid-Atlantic States, and more recently, in Virginia, Michigan, and Ohio. The chart below shows this regional defoliation history since 1973.

Gypsy moth defoliation by region, 1973-1993



Region: NE=CT, MA, ME, NH, NY, RI, VT
MA=DE, MD, NJ, PA, WV

SE=DC, VA
NC=MI, OH

Spraying the gypsy moth

Suppressing gypsy moth populations is little more than damage control. No attempt is made to eliminate the insect, rather the objective is to prevent defoliation and the possibility of tree death. Several insecticides have been used in this effort. During the 1970's and early 1980's, a lot of carbaryl (Sevin) and trichlorfon (Dylox) were used. These were replaced in State and Federal projects during the 1980's with the bacterial insecticide, *B.t.*, and the growth regulating insecticide, diflubenzuron (Dimilin). This is shown in the following bar chart. The chart shows how spraying increased during the 1980's as gypsy moth moved south and west.

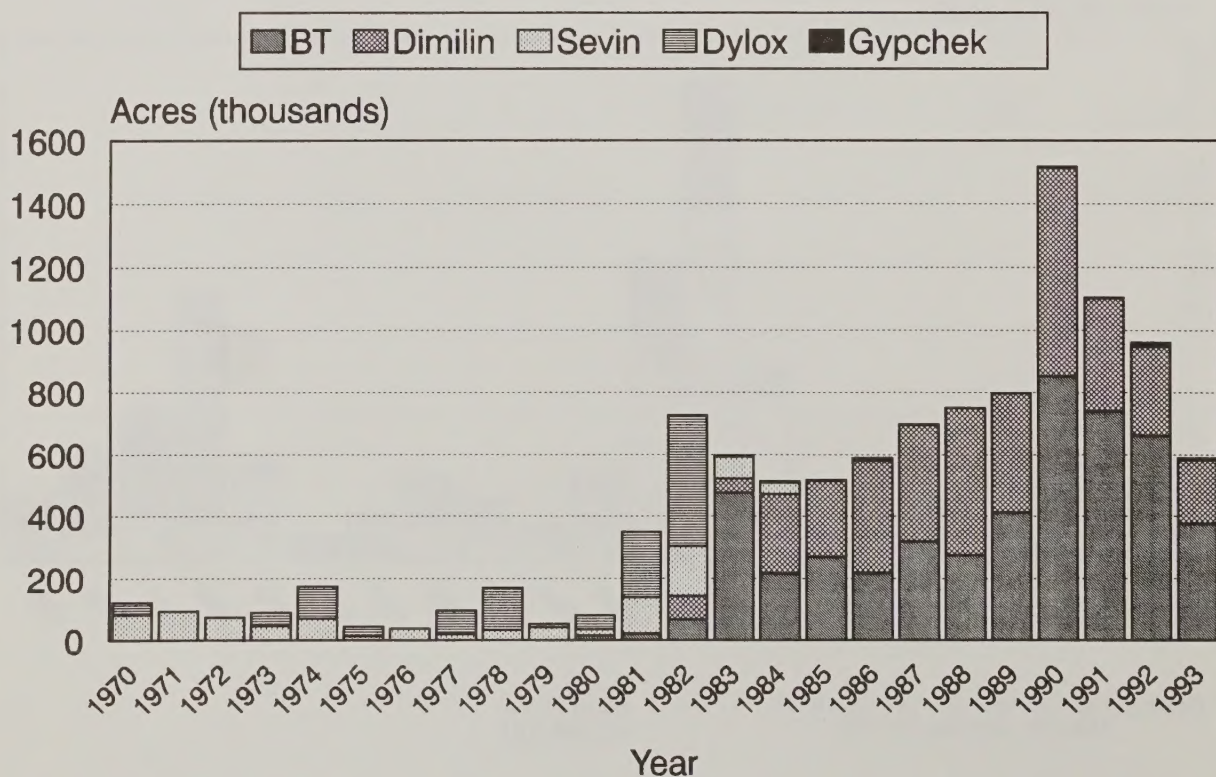
Since 1988, a viral insecticide, Gypchek, has been used to a limited extent within suppression projects. As

work progresses on this revolutionary type of insecticide, more usage will occur. For now, the insecticides of choice in State and Federal projects are Dimilin and *B.t.*

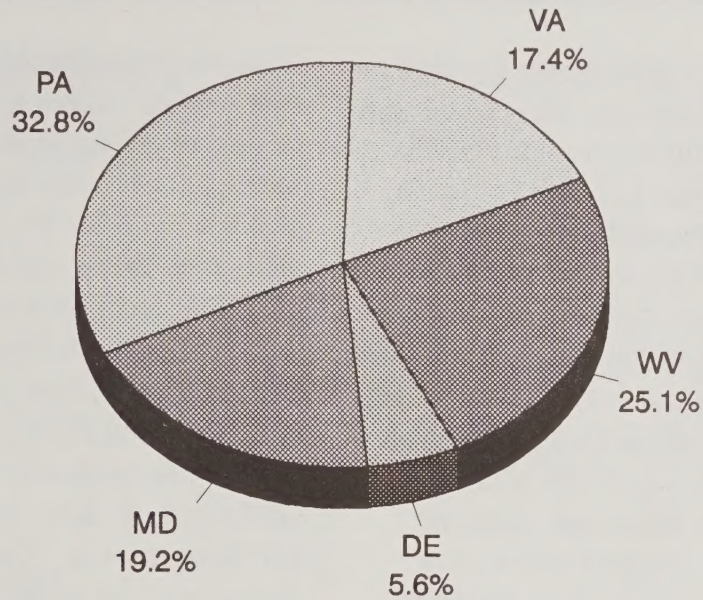
The next two pie charts illustrate the use of *B.t.* and Dimilin for suppression projects. Since 1980, 3.7 million acres have been sprayed with Dimilin and nearly 60 percent of those 3.7 million acres occurred in Pennsylvania and West Virginia--States with large gypsy moth suppression projects.

Since 1980, 4.9 million acres have been sprayed with *B.t.*, with nearly 57 percent of that occurring in Michigan and Pennsylvania. Various *B.t.* formulations, manufactured by various companies are used.

Insecticide Use in Gypsy Moth Suppression Projects - 1970-1993

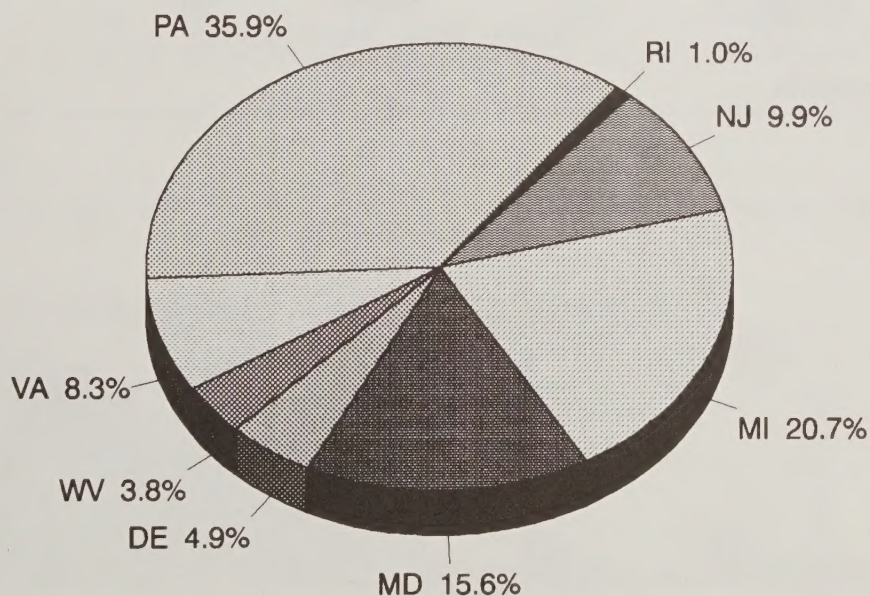


Since 1980, 3.7 million acres sprayed for gypsy moth with Dimilin



Note: Does not include eradication projects.

Since 1980, 4.9 million acres sprayed for gypsy moth with Bt



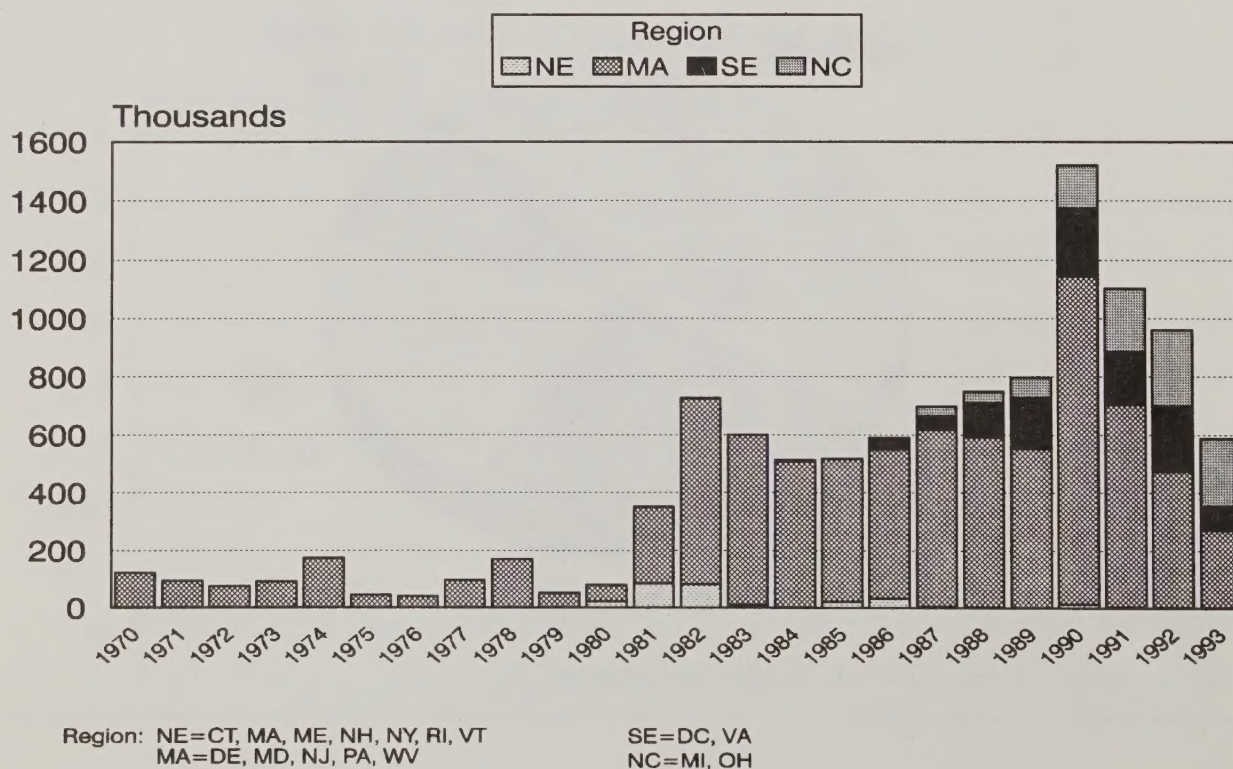
Note: Does not include eradication projects.

Suppression and defoliation by region

The following series of charts show regional and State suppression and defoliation histories. The chart below illustrates how gypsy moth suppression activities have virtually disappeared in the New England States. As the gypsy moth moved into the mid-Atlantic States, thousands of acres were, and are today, sprayed to prevent damage. Why is that? As the gypsy moth moves into new areas of susceptible forest, populations explode causing severe defoliation. Homeowners and people using the forest become alarmed and control efforts usually ensue. Defoliation is still occurring in the New England States (see Maine and Vermont charts). The outbreaks have not been either large enough or severe enough to warrant State/Federal suppression.

Something that should be mentioned about this data is that it reflects acres sprayed in the Federal/State Cooperative Suppression Projects. The data does not reflect spraying that takes place outside of these projects. In New Jersey, as an example, gypsy moth spraying is often conducted by townships or municipalities on their own using any EPA-registered insecticide. This was also true in Connecticut where communities organized their own spray projects without the involvement of the State. We do not maintain records of this "non-program" or private spraying within the GMDigest. In fact, we aren't even sure how we would get those records. The defoliation records are representative of the whole State and to that extent are complete.

Gypsy moth suppression by region, 1970-1993

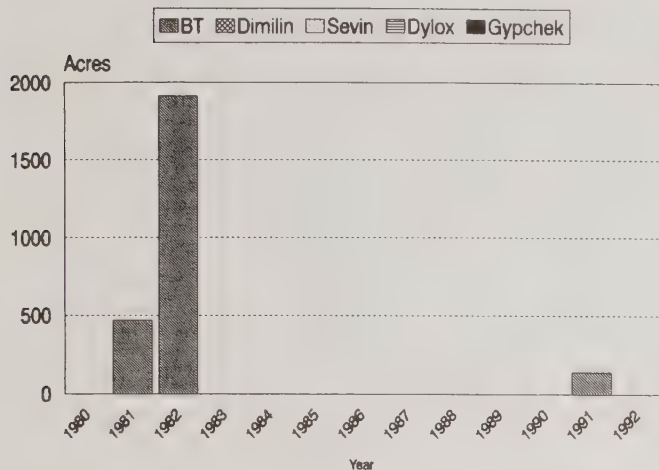


Forest Service Cooperative Suppression Projects, NE and NY

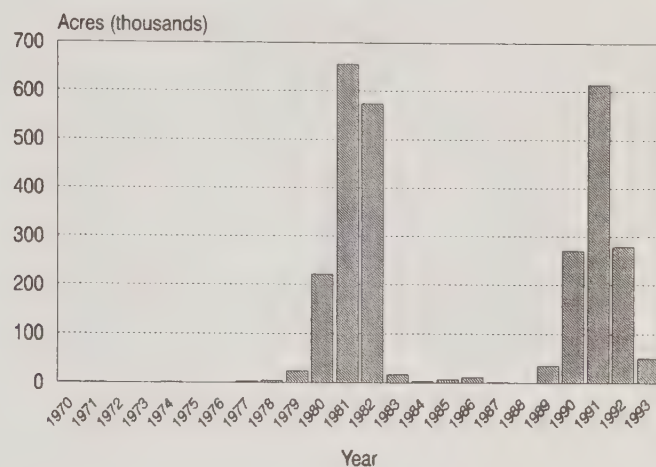
Insecticide Use

State-wide Defoliation

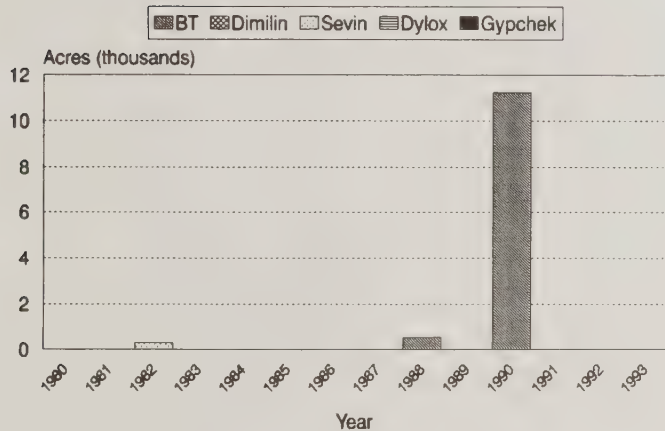
Maine - 1980-1993



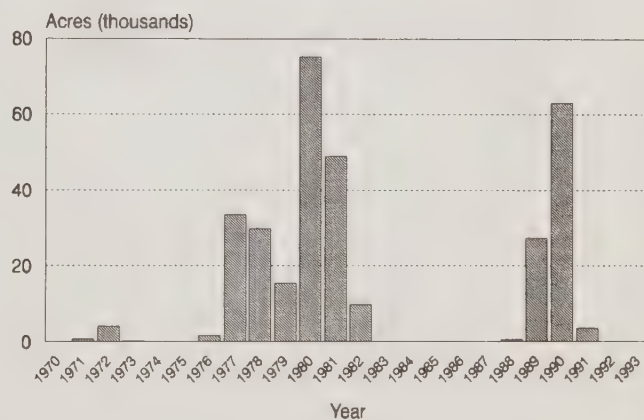
Maine - 1970-1993



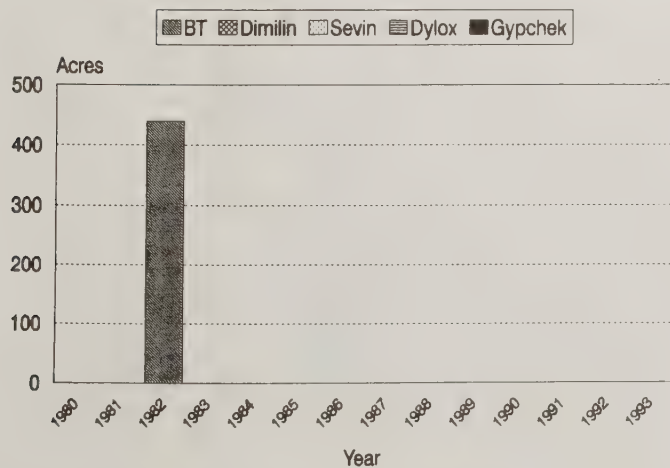
Vermont - 1980-1993



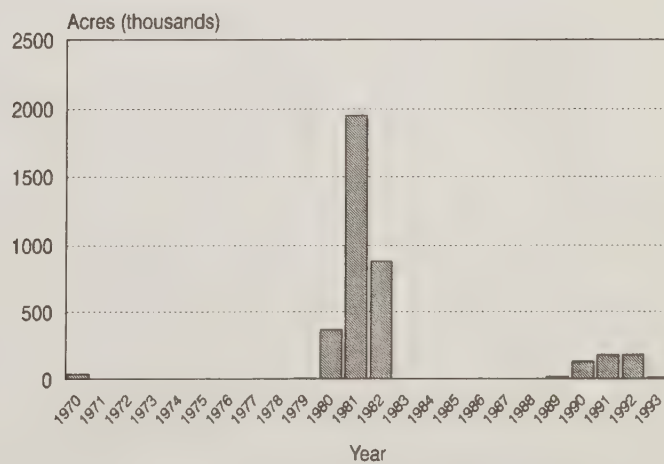
Vermont - 1970-1993



New Hampshire - 1980-1993



New Hampshire - 1970-1993

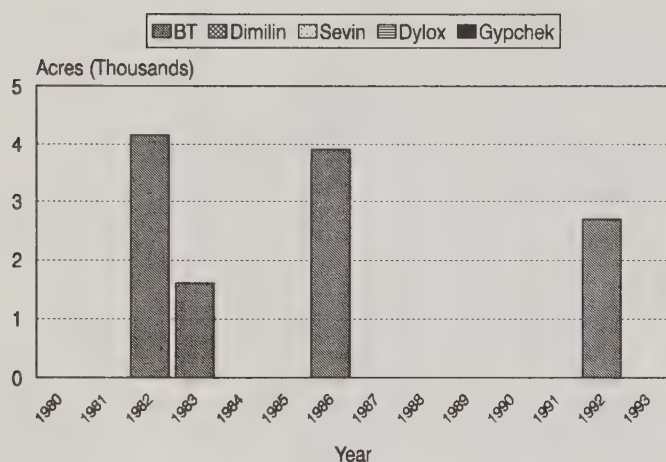


Forest Service Cooperative Suppression Projects, NE and NY

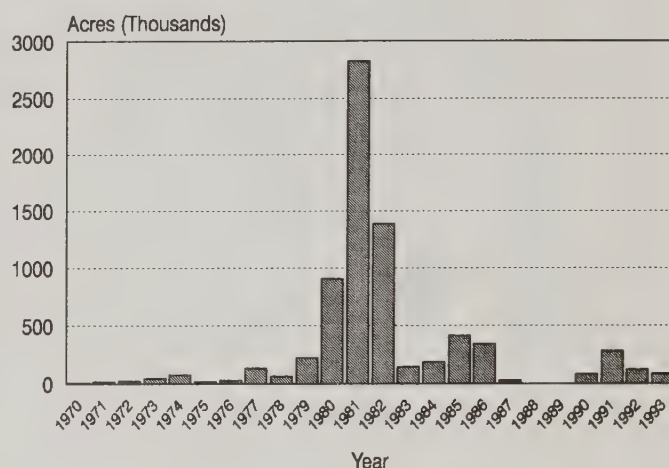
Insecticide Use

State-wide Defoliation

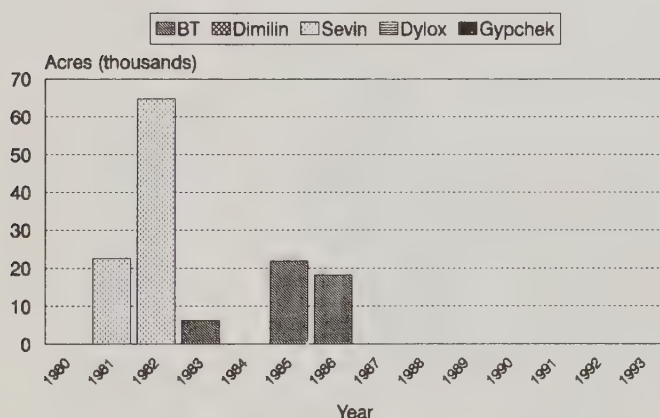
Massachusetts - 1980-1993



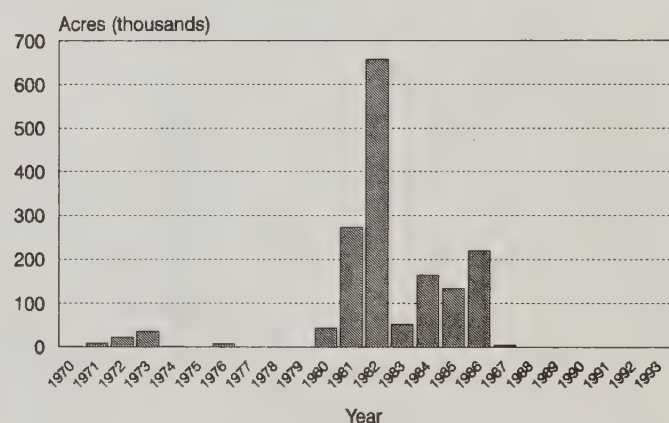
Massachusetts - 1970-1993



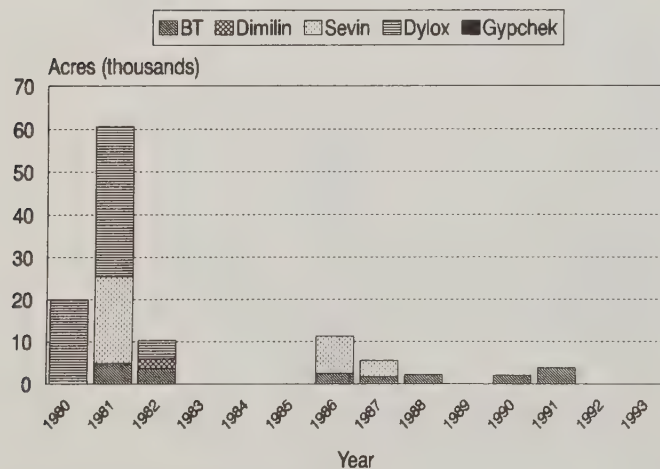
Rhode Island - 1980-1993



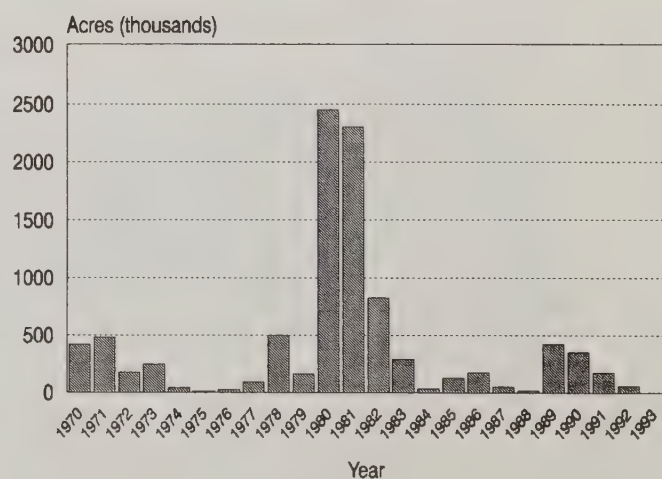
Rhode Island - 1970-1993



New York - 1980-1993*



New York - 1970-1993



*Occurred on Seneca Nation of Indians.

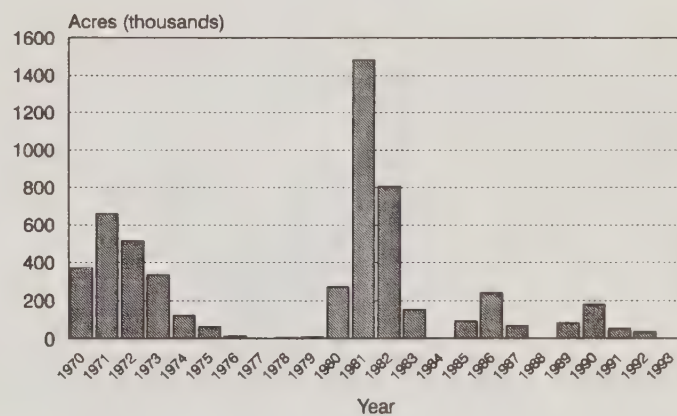
Forest Service Cooperative Suppression Projects, NE and NY

Insecticide Use

State-wide Defoliation

Connecticut has not participated in a Cooperative Gypsy Moth Suppression Project in recent years.

Connecticut - 1970-1993

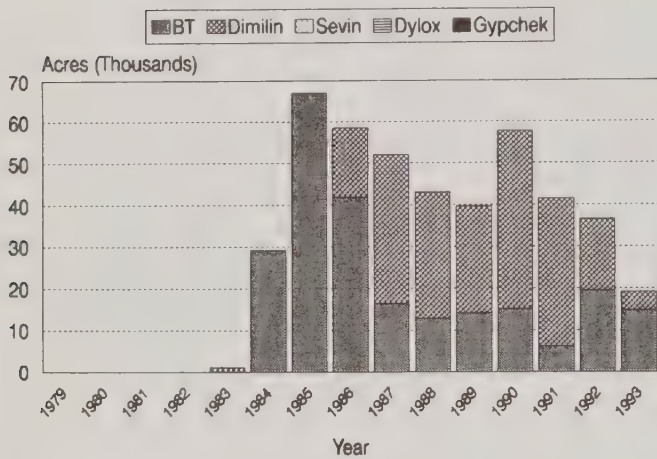


Forest Service Cooperative Suppression Projects, Mid-Atlantic

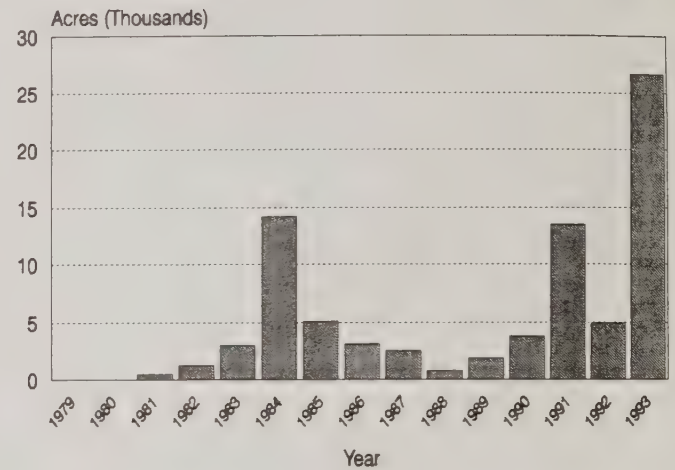
Insecticide Use

State-wide Defoliation

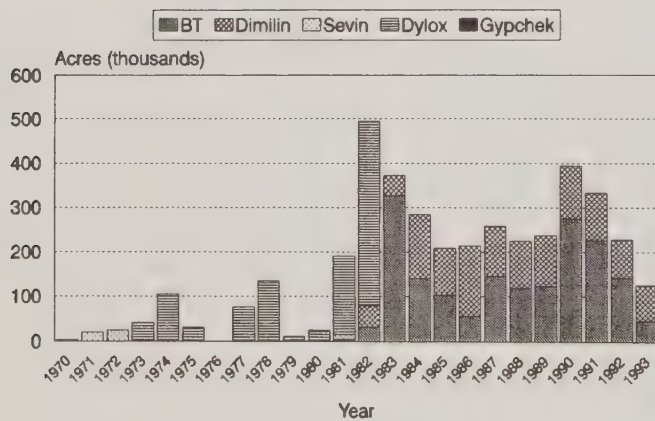
Delaware - 1979-1993



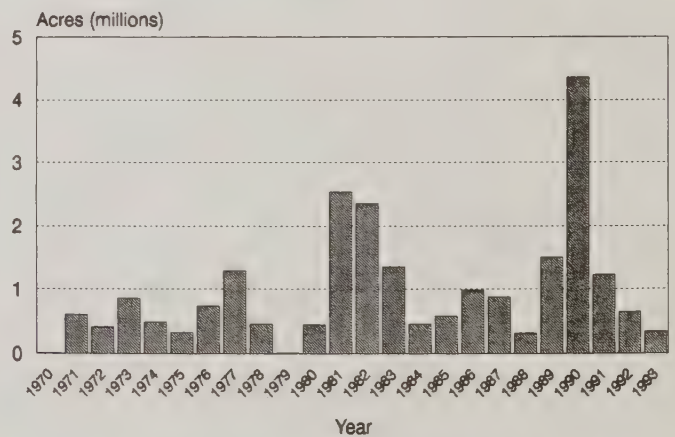
Delaware - 1979-1993



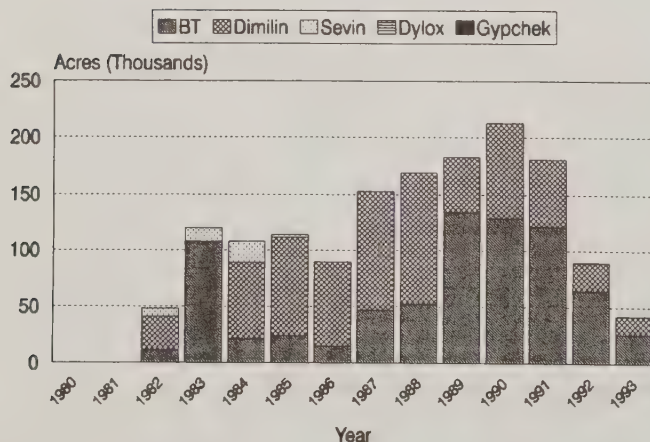
Pennsylvania - 1970-1993



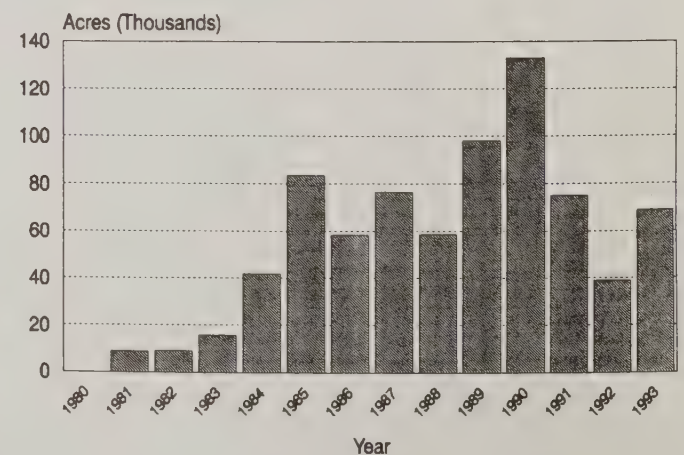
Pennsylvania - 1970-1993



Maryland - 1980-1993



Maryland - 1980-1993

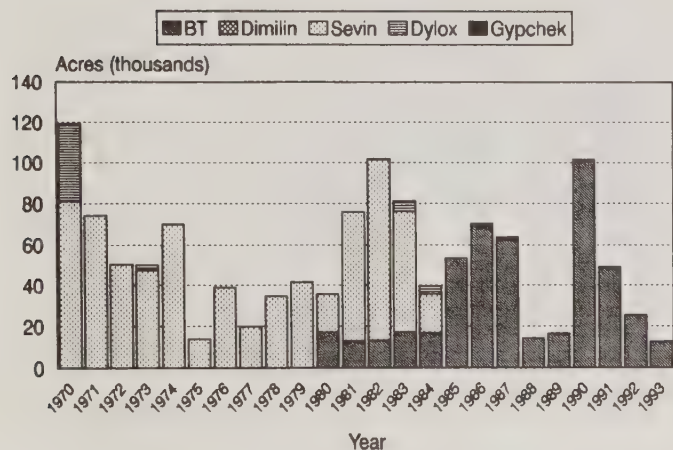


Forest Service Cooperative Suppression Projects, Mid-Atlantic

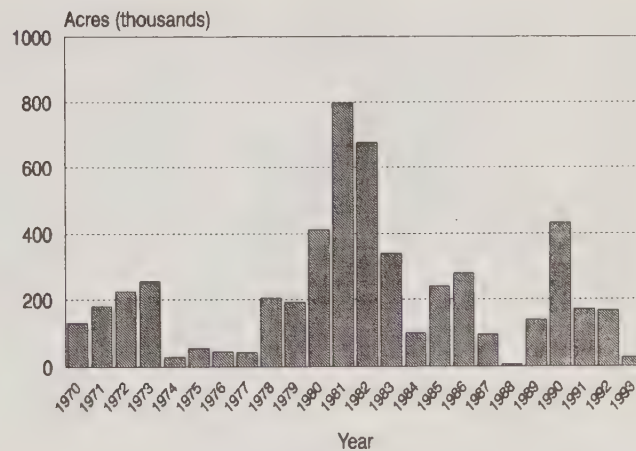
Insecticide Use

State-wide Defoliation

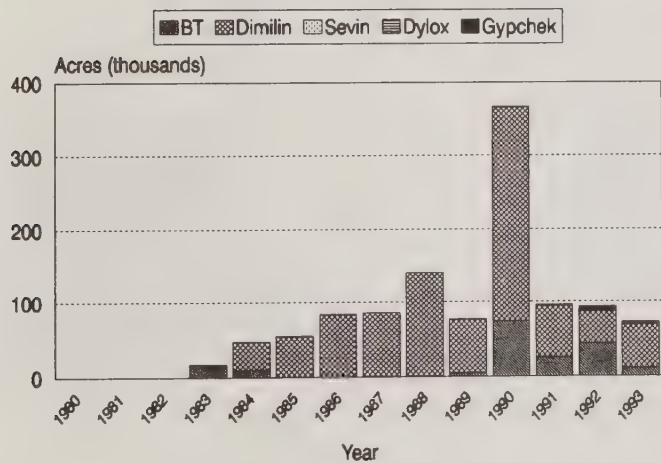
New Jersey - 1970-1993



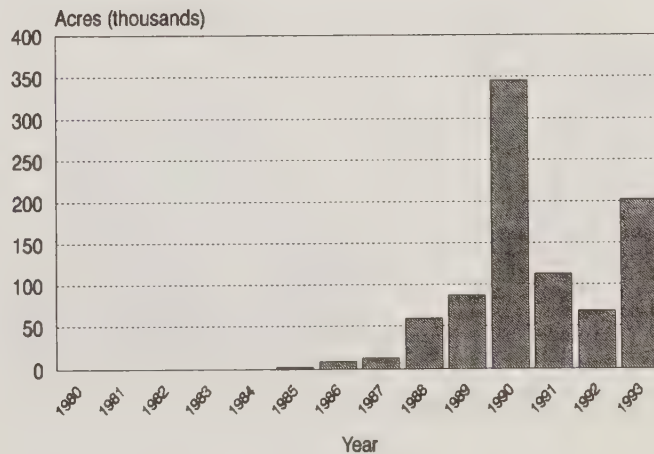
New Jersey - 1970-1993



West Virginia - 1980-1993



West Virginia - 1980-1993

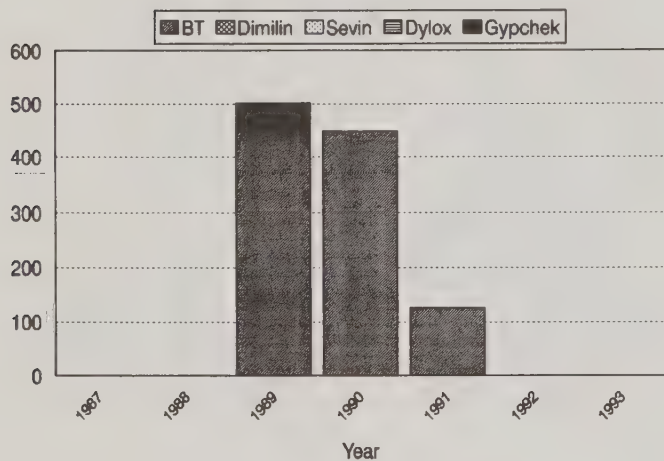


Forest Service Cooperative Suppression Projects, Southeast

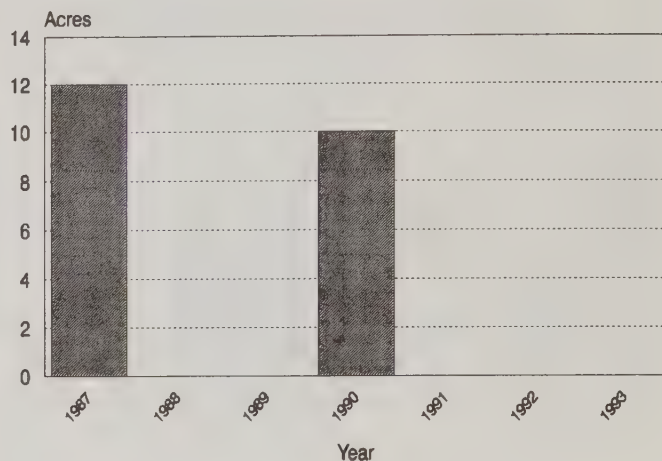
Insecticide Use

State-wide Defoliation

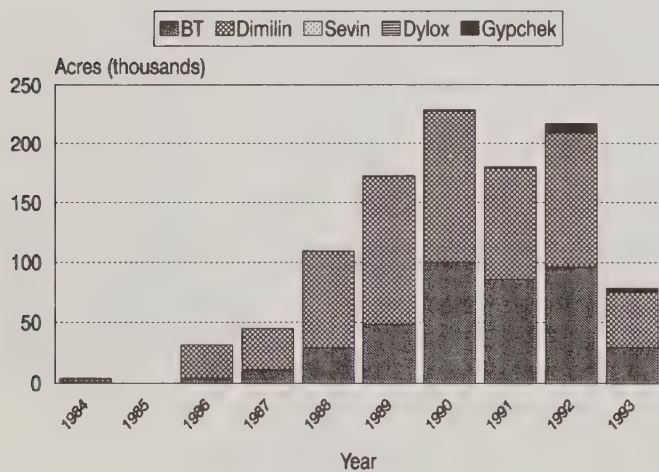
District of Columbia - 1987-1993



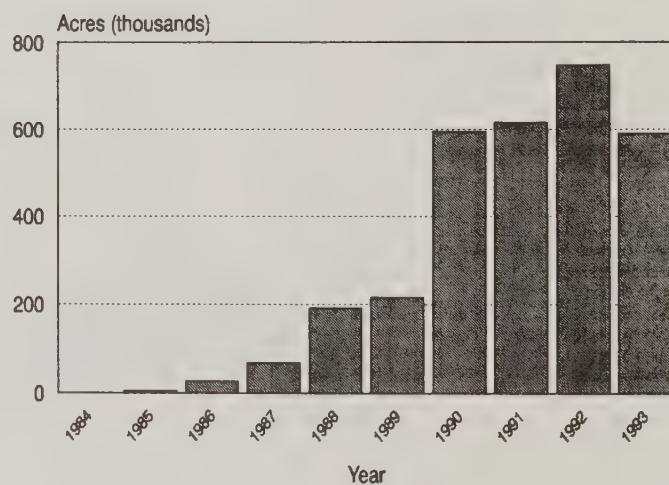
District of Columbia - 1987-1993



Virginia - 1984-1993



Virginia - 1984-1993

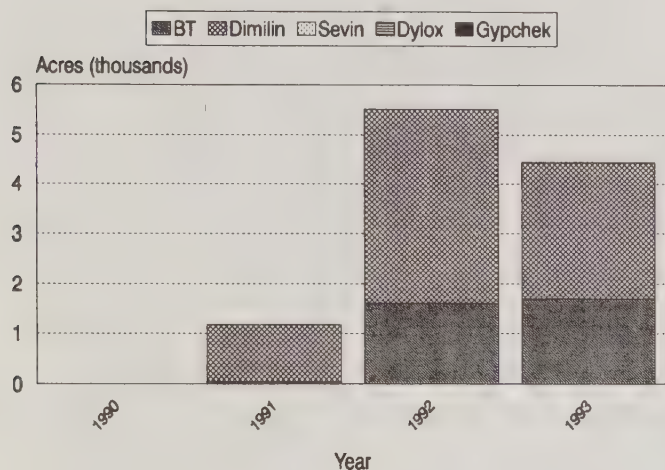


Forest Service Cooperative Suppression Projects, North Central

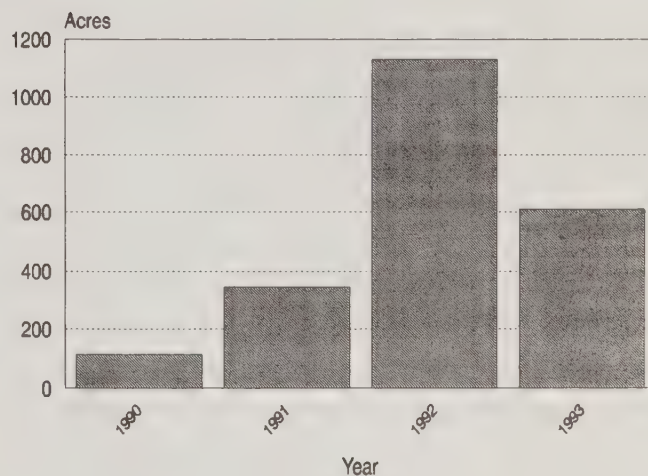
Insecticide Use

State-wide Defoliation

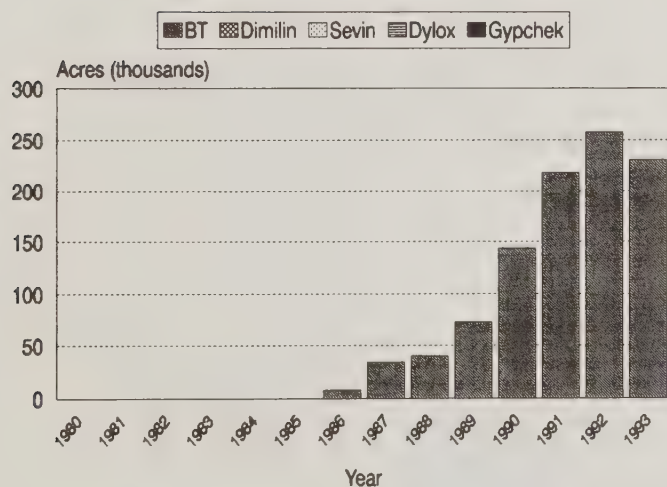
Ohio - 1990-1993



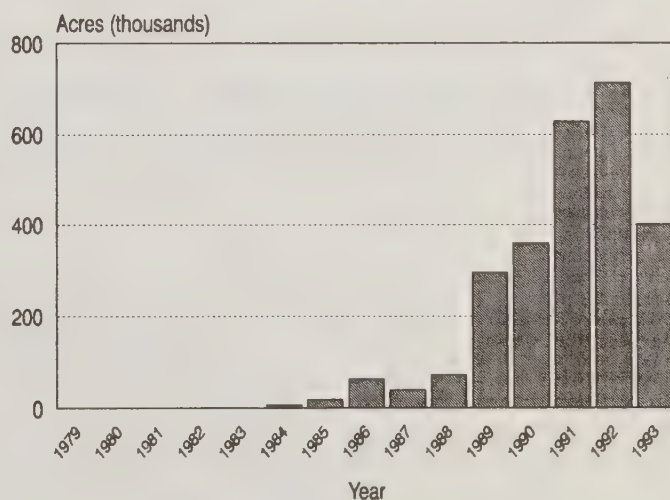
Ohio - 1990-1993



Michigan - 1980-1993



Michigan - 1979-1993



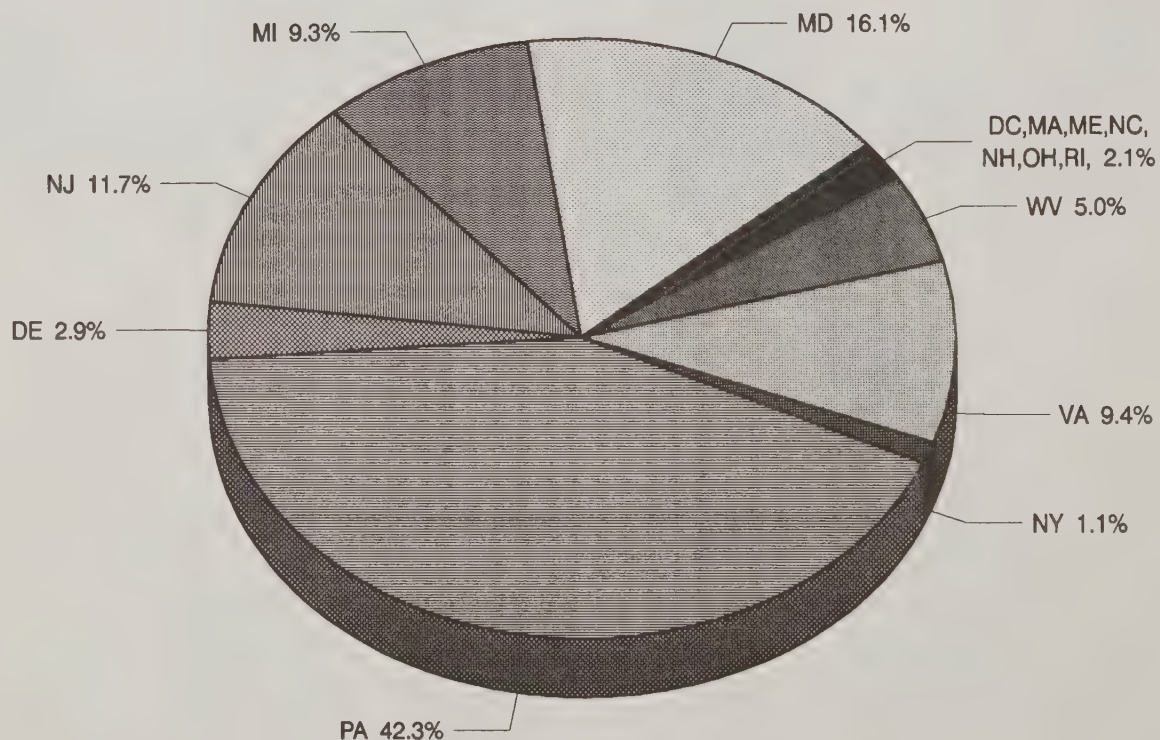
Cost of spraying

The pie chart below illustrates State and Federal expenditures for gypsy moth suppression projects since 1980. The \$143 million represents the total cost of operating gypsy moth suppression projects. This includes pre-suppression surveys, surveys to evaluate treatment success, monitoring the treatment project, hiring people to help, purchasing equipment, vehicle expenses, and, of course, the cost of spraying. Conducting a proper and safe aerial spray project isn't cheap. And, we don't expect it to be. We want enough surveys, people, training, and equipment to insure that each project is conducted correctly, safely, and with utmost concern for the environment. Each project is preceded by an environmental analysis in

which alternatives to spraying are evaluated; and, risk to human health and risk to the environment are also evaluated. It is important that the benefits of spraying outweigh the costs. Nevertheless, suppression projects must be conducted following the principles of integrated pest management. And, this requires considerable upfront costs.

One of the benefits of these Cooperative Gypsy Moth Suppression Projects is that a lot of professional expertise is brought together in conducting a project. We think that, overall, this results in the safest and most effective way of delivering a large-scale forest pest management program.

In 14-year period (1980-1993), \$143.4 million dollars spent conducting gypsy moth suppression projects

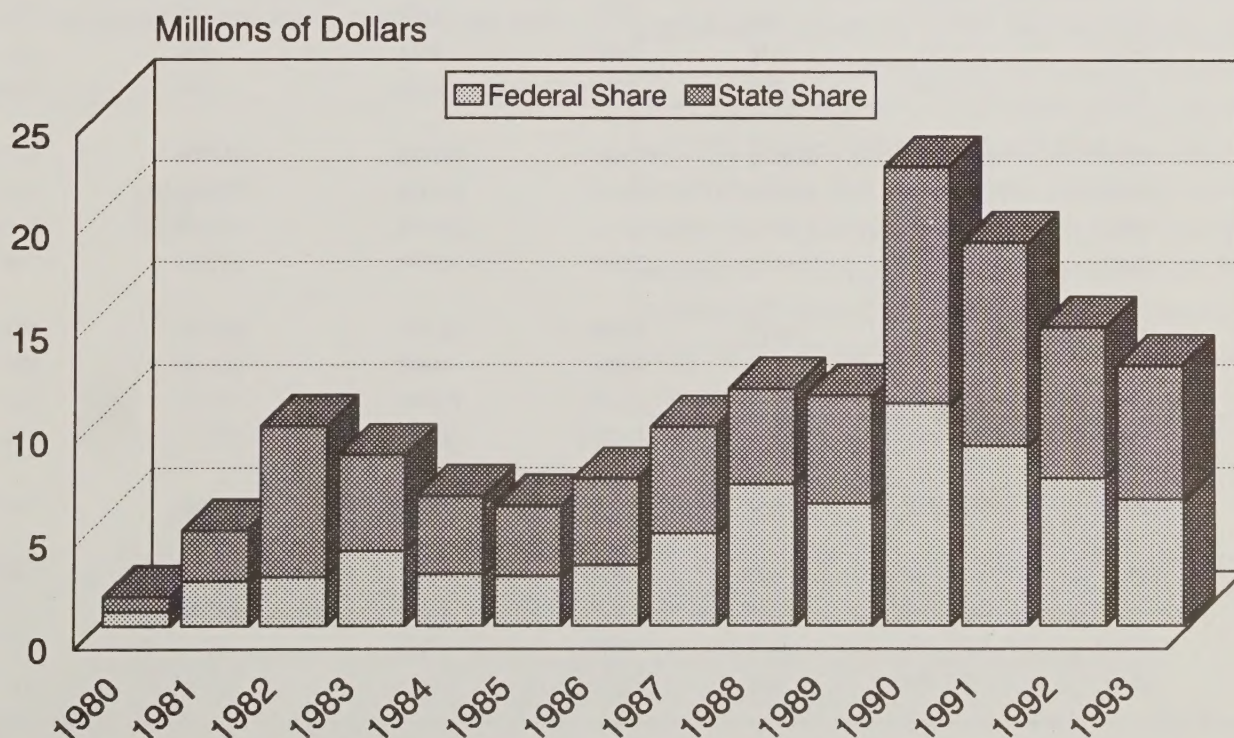


The Cooperative Gypsy Moth Suppression projects represent cooperation between the USDA Forest Service and State agencies to develop, finance, and deliver a pest management program. The Forest Service cost shares and provides technical support, training, and assistance in developing environmental analyses. The State agencies carry out the project. In some States, West Virginia is an example, the cost of spraying may be partially offset by landowner contributions.

The Forest Service also conducts suppression projects on Federal lands. The Allegheny National Forest (Pennsylvania), the Monongahela National Forest (West Virginia), the Jefferson and George Washington National Forests (Virginia), Gettysburg National Battlefield (Pennsylvania), and Aberdeen Proving Grounds (Maryland) are examples of Federally-managed lands where gypsy moth suppression has taken place. All of these costs are reflected in the preceding pie chart and the bar chart below.

The table on the next page illustrates the combined Federal-State costs by year, in addition to the acres of *B.t.* and Dimilin that were sprayed, the subsequent amount of defoliation that occurred within the State, and the calculated cost per acre for the year. This last statistic is obtained simply by dividing the total cost (Federal and State) by the acres sprayed. Costs per acre vary depending upon which insecticide is used, the amount of spraying, and overhead associated with getting a project underway. Sometimes this overhead may be the most important aspect of a pest management program. It is the time and effort put into planning, analyzing, and monitoring the project. Another point worth mentioning relates to cost/acre figures found within this table. Notice how smaller projects usually cost more per acre to implement. This is due to economies of scale and the upfront costs of gathering people and equipment.

Since 1980, \$143.4 million spent spraying the gypsy moth--
47% of the total occurring in the last 4 years*



*Includes Cooperative, Other Federal, National Forests, and AIPM projects.

Suppression, Defoliation, and Costs--1990-1993 - State Cooperative

State	Year	Total Cost*	Acres Treated		Total Acres Treated	Total Acres Defoliated	Cost/ Acre
			Bt	Dimilin			
DE	1990	\$433,200	15256	42462	57718	3790	\$7.51
	1991	\$366,752	6219	35353	41572	13475	\$8.82
	1992	\$483,034	19375	17280	36655	4943	\$13.18
	1993	\$256,509	14817	4255	19072	26687	\$13.45
MA	1992	\$70,560	2685	0	2685	123794	\$26.28
MD	1990	\$4,400,513	104128	83595	187723	133062	\$23.44
	1991	\$4,340,092	95231	59423	154654	75197	\$28.06
	1992	\$3,108,080	58676	24778	83454	38704	\$37.24
	1993	\$2,265,973	25424	15970	41394	68850	\$54.74
ME	1991	\$5,000	140	0	140	614509	\$35.71
MI	1990	\$1,809,800	143240	0	143240	358338	\$12.63
	1991	\$3,555,600	216597	0	216597	626689	\$16.42
	1992	\$3,537,688	255301	0	255301	712227	\$13.86
	1993	\$3,609,570	228400	0	228400	399306	\$15.80
NC	1993	\$10,700	360	0	360	0	\$29.72
NJ	1990	\$1,853,911	100827	575	101402	431235	\$18.28
	1991	\$1,137,860	49127	0	49127	169900	\$23.16
	1992	\$733,348	25192	0	25192	165960	\$29.11
	1993	\$561,850	12309	0	12309	27710	\$45.65
OH	1991	\$100,050	50	1127	1177	345	\$85.00
	1992	\$152,340	1610	3901	5511	1130	\$27.64
	1993	\$172,364	1700	2738	4438	610	\$38.84
PA	1990	\$9,855,810	274232	117888	392120	4357700	\$25.13
	1991	\$6,718,950	225181	105344	330525	1230066	\$20.33
	1992	\$3,386,261	118673	85121	203794	641445	\$16.62
	1993	\$2,209,409	29827	78857	108684	331581	\$20.33
VA	1990	\$1,858,316	34616	92999	127615	594000	\$14.56
	1991	\$2,040,170	30254	58433	88687	616200	\$23.00
	1992	\$1,519,156	43185	64264	107449	748000	\$14.14
	1993	\$1,433,200	21419	40035	61454	589100	\$23.32
VT	1990	\$232,432	8050	0	8050	63000	\$28.87
WV	1990	\$1,375,000	145	186306	186451	345078	\$7.37
	1991	\$256,705	496	27658	28154	112900	\$9.12
	1992	\$384,819	3408	26516	29924	67508	\$12.86
	1993	\$1,276,050	3090	58535	61625	202490	\$20.71

*Cost does not include National Forests, Other Federal, or special Federal projects within the State.

New Publications

Gottschalk, Kurt W. and Russ W. MacFarlane. 1992. Photographic Guide to Crown Condition of Oaks: Use for Gypsy Moth Silvicultural Treatments. USDA Forest Service, General Technical Report, NE-168. 8 pp.

Crown condition of oaks (Quercus spp.) as a measure of tree vigor, has been shown to be the single most important factor in predicting mortality due to gypsy moth (Lymantria dispar L.) defoliation-induced stress. Although tree vigor is a continuous variable, common practice has been to assign trees to one of three crown condition classes to reduce subjective error. The assessment of crown condition is based on ocular estimates of percent of dieback in the crown, foliage density, size, color, and presence of epicormic branches. Crown condition classes for oaks are defined. Color photographs are provided as guides to assessing crown condition, and the various factors involved in assigning crown conditions are discussed. Applications in vulnerability rating and silvicultural treatments to minimize gypsy moth impacts are presented.

Gottschalk, Kurt W. 1993. Silvicultural Guidelines for Forest Stands Threatened by the Gypsy Moth. USDA Forest Service, General Technical Report, NE-171. 50 pp.

Silvicultural treatments that may minimize gypsy moth impacts on host hardwood stands are recommended based on ecological and silvicultural information. Decision charts are presented that match the proper prescription to existing stand and insect population conditions. Preoutbreak prescriptions focus on reducing stand susceptibility and vulnerability by increasing stand vigor, removing trees most likely to die, reducing gypsy moth habitat, reducing preferred gypsy moth food sources, improving predator and parasite habitats, and regenerating stands that are close to maturity or understocked. Regeneration cuttings before defoliation preserve seed production, established advanced regeneration, and stump sprouting potential. Outbreak prescriptions prioritize stands for possible insect population control actions and regenerate stands that are close to maturity or understocked. Postoutbreak prescriptions center on efficient salvage of dead trees and the regeneration of stands that are either understocked due to excessive mortality or are close to maturity. Information on utilization of dead trees is provided. While these guidelines have not been extensively tested, they represent the current knowledge of the impacts of gypsy moth defoliation on forest stands.

To request copies of these publications, contact the Gypsy Moth News at the address listed on the inside front cover.



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